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Chikungunya Virus: more than a mosquito bite

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Introduction

Chikungunya fever is a viral infection caused by the Chikungunya virus (CHIKV). Although seldom fatal, CHIKV causes high fevers, polyarthralgia, and rash. The mosquito-borne virus has spread rapidly in the last ten years, causing over three million cases of CHIKV worldwide (Powers, 2015). The recent outbreak initiated in Africa and the islands of the Indian Ocean in 2004 has quickly spread to Asia, Europe and the Americas (CDC, 2015). According to the CDC (2015), until 2014, cases in the United States had only been linked to foreign travel outside of the Americas. As the outbreak has grown, cases of local transmission in Florida and Puerto Rico have necessitated increased education for healthcare clinicians in prevention, detection and treatment of CHIKV (Kendrick, Stanek, & Blackmore, 2014). There is currently no antiviral treatment CHIKV or vaccine to prevent CHIKV (Weaver, Osorio, Livengood, Chen, & Stinchcomb, 2012).

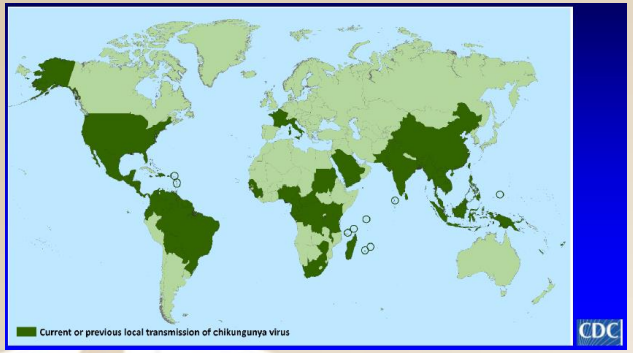
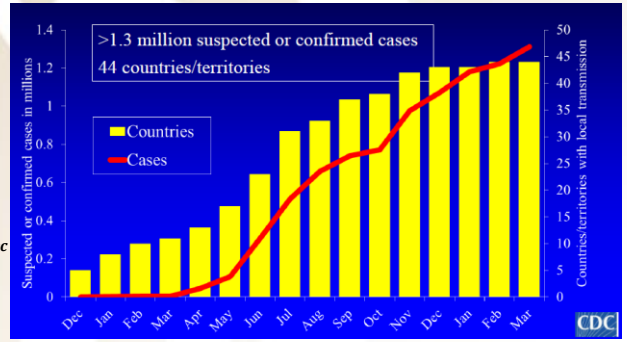


Table 1. Countries with reported local transmission of chikungunya virus disease (CDC, 2015)

The author was first alerted to CHIKV during a trip abroad. A poster depicting the CHIKV rash and CHIKV transmission information were presented in an international airport. After many visits to East Africa and Central America, the author is interested in practicing in a foreign clinic where CHIKV is currently diagnosed in the population. To many people in the regions affected by CHIKV, there are limited resources to healthcare, education, and nutrition. Simple acts like mosquito nets, long sleeve shirts, and removal of stagnant water may keep food on the table for struggling families, kids in school, and medical facilities from overcrowding. After initial research, it is evident that CHIKV could become a more widespread disease in the U.S. at any time. With no vaccination available and symptom management as the only treatment, more work must be done to educate healthcare providers and define a detection and treatment plan with reliable outcomes around the world.

Table 2. Reported chikungunya cases and number of countries/ territories with local transmission in the Americas, Dec 2013– Mar 2015 (CDC, 2015)



Pathophysiological Process

CHIKV is a single stranded RNA arbovirus transmitted via mosquito vectors, specifically aedes aegypti and aedes albopictus (CDC, 2015). Three genotypes classify the virus: Asian, West African, and Central/East/South African (Vega-Rúa et al, 2015). The vectors live in warm, tropical climates and are also carriers for dengue virus. Aedes aegypti and aedes albopictus are active during the day, with females biting several times during a feeding cycle (Weaver, Osorio, Livengood, Chen, & Stinchcomb. 2012). According to Weaver, Osorio, Livengood, Chen, and Stinchcomb (2012), primates were initial hosts for CHIKV, but soon humans became infected.

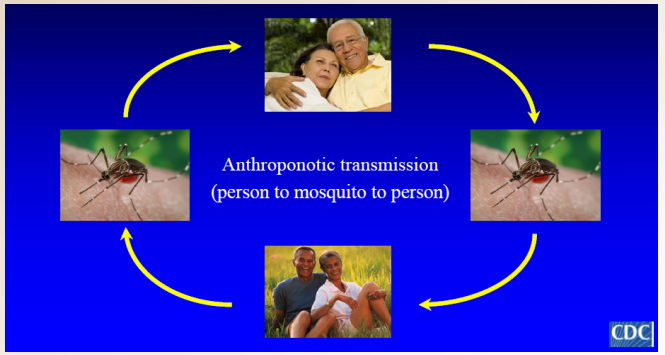


Table 3. Primary transmission cycle (CDC, 2015)

The transmission cycle is host-mosquito-host, meaning that an infected host is bitten by a vector whom then bites another host and deposits the infection (CDC, 2015). CHIKV spreads rapidly in urban environments where the mosquito has multiple hosts in close proximity with high virulence (Sharp et al., 2014). After transmission, the incubation period in the host is 3-7 days, with virus replication starting in the skin and traveling to the liver and joints through the blood stream (Weaver, Osorio, Livengood, Chen, & Stinchcomb. 2012). CHIKV is detected through serum specimen by real-time reverse transcription-polymerase chain reaction (rPT-PCR) test within five days of symptom onset or IgM capture enzyme-linked immunosorbent assay (MAC-ELISA) at the sixth day and beyond (Sharp et. al., 2014). Once a host is infected, protection from CHIKV with long-term immunity is noted (Sharp et al., 2014).

Signs and Symptoms

- The two hallmark symptoms of CHIKV are fever and polyarthralgia effecting bilateral joints (Staples & Fischer, 2014)).
- Symptoms also include headache, rash, muscle pain, and nausea and typically subside within two weeks (Harvey, 2015).
- Foissac, Javelle, Ray, Guérin, and Simon (2015) report that two recent epidemics of CHIKV are known to cause post-chikungunya rheumatoid arthritis.
- Five percent of individuals suffering from CHIKV will suffer from post-chikungunya rheumatoid arthritis lasting more than three months and experiencing pain and impaired mobility
- (Foissac, Javelle, Ray, Guérin, & Simon, 2015). Death occurs infrequently and has been reported in less than one percent of cases, most often plaguing older adults with comorbid conditions (Staples & Fischer, 2014).

Significance of Pathophysiology

CHIKV has rapidly spread throughout temperate and tropical climates around the world. During the epidemic initiated in St. Martin with CHIKV Asian genotype in 2013, nearly one million people were infected throughout the Americas (Halstead, 2015). The need to develop rapid detection protocol and anticipate outbreaks before occurrence will lead to reduced infectivity (Prat et al., 2014). Primary prevention is currently protection of humans from exposure to mosquitos, but further prevention requires protecting humans ill with CHIKV from exposure to further mosquito bites (CDC, 2015).

Implications for Nursing Care

Nurses should be aware that CHIKV is transmitted from mosquitos in the United States (CDC, 2015). The idea that CHIKV is isolated in Asia, Africa, and South America is outdated and dangerous. Any patient that has traveled to tropical or temperate climates, where aedes aegypti and aedes albopictus are present, is at risk for developing CHIKV (CDC, 2015). Health care providers should consider possible CHIKV transmission for any patient presenting with polyarthralgia, fever, and rash.

No vaccine or medication will prevent the disease at this time, but many steps can be taken to decrease the likelihood of contracting the virus (Prat et. al., 2014). Nurses should instruct patients living or traveling in CHIKV outbreak locations on preventative measures. People living or traveling in these areas should cover with long sleeve clothing when outside, use mosquito repellant with DEET, utilize air-conditioning if available, keep screens on doors and windows, and empty any standing water from containers (CDC, 2015). If a patient develops signs of CHIKV, the patient should maintain strict avoidance of the mosquito vector in the first week (CDC, 2015).

Conclusion

Chikungunya means "that which bends up" in the Makonde language spoken in Tanzania and Mozambique (Halstead, 2015). The tribe that gave CHIKV the current name is a short 24-hour trip via modern travel from the United States. Ease of travel and global economy have brought CHIKV to areas that are not home to aedes aegypti and aedes albopictus. Health care providers must continue to educate themselves on emerging diseases such as CHIKV, for they are at the forefront of education, prevention, research, detection and treatment. Who knows, the next case of CHIKV may be detected by you.

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